Walter H. Flood
& Co., Inc.
ENGINEERS

Soil Investigation No. 7605-0039

Paxton Landfill

116th & Paxton

Chicago, Illinois

Prepared for

Paxton Landfill Corporation

12201 South Oglesby

Chicago, Illinois 60633

December 14, 1976

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December 14, 1976

Paxton Landfill Corporation
12201 South Oglesby
Chicago, Illinois 60633

Attention: Mr. Raymond Nudi

Re: Soil Investigation No. 7605-0039
Paxton Landfill
116th & Paxton
Chicago, Illinois

Gentlemen:

Enclosed is our report of the subsoil investigation for the reference project. Some of the conclusions reached in this report were previously given to Mr. Don Fielding by telephone on October 8, 1976.

If you have any questions concerning this report or should we be able to assist you in any way, please call upon us.

The soil samples are being retained in our laboratory for thirty (30) days for your possible future reference.

Respectfully submitted,

WALTER H. FLOOD & COMPANY, INC.

DAS/nc
3-
1- Charles W. Greengard Associates, Inc.
1374 Old Skokie Road
Highland Park, Il. 60035
Attn: Don R. Fielding

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Investigation No. 7605-0039

I. Scope

This report has been prepared from the furnished and gathered data in accordance with the general conditions attached hereto and represents the results of the additional subsoil investigation for the proposed solid waste disposal site at 116th Street and Paxton Avenue in Chicago, Illinois. The purpose of the investigation is to secure and log subsoil information, to record the geological nature, type, consistency and thicknesses of the various soil strata as encountered in the borings, to perform laboratory tests, and to evaluate all of the data obtained in order to make conclusions and recommendations to aid in the appraisal of the property by others and to assist others in the design and construction of the specific project at the location discussed herein.

II. Site Geology, Soil Conditions and Characteristics

The project site is located in a general area of post glacial lake bottom. The area was inundated in the geologic past by the waters of Lake Chicago, the geologic predecessor to the present day Lake Michigan. The lacustrine soils of the site were likely deposited during the Glenwood, Calumet, Toleston stages of Lake Chicago, and then under the waters of Lake Algonquin; Nipissing, and Algoma.

The original deposition of the soils was aided by wave erosion and later minor deposits in the land areas that were beaches, bars, and spits. Essentially, the manner of soil deposition is horizontally bedded. Recently (geologically speaking), man placed fill above the natural soils. Underlying the lake bottom soils are soils of glacial origin. The glacial soils are a sequence of tills of silt loam, and silty clay loams of the Park Ridge, Tinley, and Valparaiso glacial periods. Four (4) locations were selected at the reference project site for soil borings, in accordance with the instructions from your representative. The borings extend to a total depth of 70.0 feet from existing grade (an additional boring, numbered 1A, was also taken approximately 6.3 feet south of Boring 1, but only to a depth of 12.0 feet). The following is a generalized discussion of the soil stratigraphy as disclosed by these borings. Reference should also be made to the enclosed logs of borings for a more detailed description of the various soils encountered.

Fills

The fills of the site were generally immediately below the pavements or loamy "topsoil" and typically consisted of sand and cinders as well as some building material debris including bricks, wood, and glass. Other fills of the site ranged from black clayey

II. Site Geology, Soil Conditions and Characteristics (Cont'd.)

Fills (Cont'd.)

loam to black clay with traces of cinders. All the fills encountered at the boring locations are inert and not subject to biological decomposition. Total thickness of the fills at the boring loctions ranges from about 5 to 10 feet, with most of the fills being loose to medium in relative density as determined by standard penetration tests.

In general, the fills encountered at the boring locations appear to be suitable for use as daily cover, although some of the larger masses such as broken concrete, brick or boulders may have to be selectively discarded. All excavations should be considered as a continuous test pit, and close observations made to detect any possible bio-degradable or other unsuitable fill areas.

Post-Glacial Lake Bottom Sediments

A layer of fine grained sand with traces of silt was encountered immediately below the upper fills and is occasionally interbedded or overlain by a layer of silty clay as noted at the location of Borings 2 and 3. Thickness of these sedimentary soils (primarily granular) varies from about 10 to 15 feet, and they extend to depths ranging from 10.0 to 21.0 feet below existing grade at the boring locations. The granular soils are water-bearing, ranging from very loose to medium in relative density as determined by standard penetration tests, and appear to be the largest quantity of the upper post-glacial sediments found in the test borings. They are non-plastic, generally fine grained, containing less than 20% silt-sized particles, and have commercial value because they will likely meet relatively rigid specification requirements for sand fill. The silty clay sediments, where encountered, are cohesive, plastic, and vary in consistency from soft to tough.

Glacial Tills

The silty clay tills, likely of the Tinley Moraine, underlie the granular soils and were encountered at depths of from 10.0 to 21.0 feet from existing grade and extend to depths ranging from 25.0 to 40.0 feet at the boring locations. These clay tills are stiff to hard in consistency, highly impermeable, and occasionally layered with glacio-fluvial sand and silt layers.

At depths ranging from about 30.0 to 40.0 feet, the soils of the Valparaiso Morainic System, deposited during the Cary Substage of the Wisconsin Ice Epoch, were encountered and extended at least to the bottom of the borings. The Valparaiso till is a complex deposit consisting typically of clayey silt or silty clay soils with traces of pebbles and bou...

II. Site Geology, Soil Conditions and Characteristics (Cont'd.)

Glacial Tills (Cont'd.)

predominantly of dolomite, and occasionally layered with glacio fluvial sand and silt seams. The clayey silt and silty clay till of the Valparaiso Moraine is also considered a highly impervious soil.

More detailed information concerning visual description of samples retrieved, approximate strata boundaries, field-measured Standard Penetration Resistances, and laboratory test results may be found by referring to the boring logs included with this report.

III. Feasibility of Site for Solid Waste Disposal

The deposits of clay till encountered at all four of the full-depth boring locations included in this investigation, below the upper fills and granular soils at depths of from 10 to 21 feet below existing grade at the boring locations, are considered well-suited to preclude the flow of contaminants from solid waste that may be placed on the subject site. These impervious silty clay or clayey silt soils are also well-suited for trench or area fill methods for solid waste disposal.

Some difficulty can be expected, however, in excavating in the sand soils below ground water levels. Ground water at the time of the borings was about 3.0 to 8.0 feet below existing grade (see boring logs for exact depth), "perched" in the upper fills and granular soils above the more impervious clay soils below. Where excavations extend below ground water level, dewatering of the fine sands must be considered; where dewatering is not undertaken, it is likely that "running" of the sands will occur and the bottom of the excavation may become quick. Dewatering of the sands can probably be best accomplished utilizing well points prior to excavation of trenches, or some sheeting and bracing or wide sloping of excavations may be required. While the subsoils encountered below the upper fills and granular soils were primarily clay tills, occasional seams of silt and sand were noted at all four of the deeper test boring locations; no continuous pervious stratum were noted, however, and all layers or lenses of relatively more permeable sand or silt appear to be local. These granular deposits are, of course, more permeable than the clay tills, and some sealing of these irregular silt, sand, or gravel seams in the floor or wall of the proposed pit during excavation for below-grade solid waste disposal should be anticipated. Sealing of the walls of the trench after dewatering in the upper sand soils, as previously mentioned, may also be utilized to prevent the flow of ground water into the excavation. Such sealing will also be required to prevent the outward

III. Feasibility of Site for Solid Waste Disposal (Cont'd.)

flow of contaminants from filled areas, depending on the changing hydrologic conditions during construction. The clay tills can be used for the sealing of layers or seams of the more permeable granular soils by properly compacting these clay soils over them. We would recommend that a minimum thickness of 5 feet of clay till be placed over any permeable soil layers or stratas encountered in the excavations for the solid waste disposal.

The available excavation depth at the site to accomodate waste disposal will, of course, depend on the actual depth of till deposits and on the thickness of the clay tills that must be left in place to prevent downward migration of leachates to the underlying drift or bedrock aquifers anticipated. The general requirement at the present time is that 30 feet of impermeable clay tills should be left in place to prevent bedrock or aquifer contamination. Based on a review of available geologic maps of the area, the surface of the bedrock is estimated to be at a depth of from 80 to 90 feet from existing grade. The thickness of the impervious soils above the bedrock and basal aquifers as encountered at the four boring locations indicates that the planned excavation depths of 40 feet are likely feasible. Due to the clay thickness and the relative impermeability of the clay tills at the subject site, the downward migration of leachates in fills will be virtually precluded.

Laboratory permeability tests were run on composite samples of the Valparaiso tills obtained from the samples noted below, and are believed to be representative of the lower portions of silty clay and clayey silt tills encountered.

Composite Sample 1 (silty clay)		Composite Sample 2 (clayey silt)	
Boring No.	Sample No.	Boring No.	Sample No.
1	12	1	8
2	10	1	9
3	14	2	8
		4	9

These composite samples were obtained by mixing the above noted samples together and compacting them to the average density and moisture content of the individual in-situ samples. The co-efficients of permeability obtained for the above composite samples were 2.25×10^{-8} cm/sec for Composite Samples 1 and 2 respectively.

III. Feasibility of Site for Solid Waste Disposal (Cont'd.)

The upper clay tills (likely of the Tinley Moraine as previously noted) as well as the lower Valparaiso tills, which are to be excavated to provide either trenches or areas for solid waste disposal, will provide suitable materials for both daily and final cover. These excavated Tinley and Valparaiso Moraine tills are also excellently suited for sealing any permeable layers encountered in construction. Soils placed for sealing should be placed in layers and compacted to a minimum density of 95% of the maximum density as determined by the ASTM designation D 1557.

IV. Ground Water

Ground water readings were taken in each test boring and the readings recorded on the test boring logs. The observation and test wells that were installed provide additional data for the continuing evaluation of ground water levels and flows. The ground water level readings in the bore holes and observation wells were taken at the time stated on the boring logs or as noted in the observation and test well monitor data section of this report.

The ground water of the site is expected to consist of the upper ground water contained in the upper soils and the lower ground water contained in the bedrock and the anticipated overlying basal aquifer.

The upper ground water is expected to be mostly contained in the post-glacial sand soils "perched" above the more impervious underlying clay tills or confined to the lenses or seams of granular materials encountered in these upper clay tills. Its gradient and flow is expected to be westerly toward the Calumet River with a moderate rate of flow.

The bedrock (Niagaran dolomite) and basal sand, gravel aquifers were not encountered within the depth of the test borings; these aquifers are considered as a single aquifer because of interconnection. Ground water is confined in these aquifers by the overlying tills, and they rise to levels above the aquifer. The many layers of impervious till and the thickness of the till sheets preclude surface water penetration into this aquifer.

V. Observation and Test Wells

Observation wells have been placed at all of the boring locations including Boring 1A (located 6.3 feet south of Boring 1). The depths at which these wells have been placed is indicated in the table below. Note that the top of the 2-inch I.D. pipe extends above existing grade.

V. Observation and Test Wells

Well No.	Ground Surface Elev.	Top Elev.	Tip Elev.	Ground Water Data *Elev.	Date	Time
1	5.1	8.4	-40.4	5.0	9/2/76	Before Installation
				-20.4	9/2/76	After Installation
1A	5.4	9.8	- 6.5	5.6	9/2/76	Before Installation
				- 2.8	9/2/76	After Installation
2	5.6	9.0	- 4.0	3.9	9/1/76	Before Installation
				4.7	9/1/76	After Installation
3	6.2	9.9	- 5.1	5.6	8/31/76	Before Installation
				2.4	8/31/76	After Installation
4	13.5	16.3	- 7.7	8.5	8/30/76	Before Installation
				1.0	8/30/76	After Installation

*Reading made on date and time indicated; continuing readings to be made.

The procedures and materials used in the installation of the wells are as follows:

Pipe type	PVC
Pipe size	2" O.D.
Screen size	.010
Screen length	4.0'

The bored hole was used without casing if the hole was not caving, or set 3-inch I.D. casing in caving holes (not encountered at boring locations). Prior to installing the well point and sand pack, the hole was flushed with clean water. The well point and casing were set at the selected depth, and sand pack consisting of #2 Torpedo sand was placed around the well point. A backfill seal consisting of 50% bentonite and 50% sand was then placed to the ground surface. All installation data was recorded in the field, including the depth of the point tip, the length of pipe installed, the depth to the top of the sand pack, the screen size and length, and ground water levels. Continuing water level readings will be made in these wells.

VI. Construction Inspection

Reference is made to the General Conditions section of this report for recommendations concerning construction inspection of the soils and of the recommended foundations.

VII. Proposed Improvement

The furnished data for the proposed improvement indicates that the improvement is to be a solid waste disposal facility. The method of fill placement has not been decided at the time of preparing this report.

VIII. Laboratory Soil Tests

Laboratory soil tests performed on samples of the soils consisted of calibrated penetrometer tests, natural moisture content (ASTM D 2216), grain size distributions, Atterberg limits, permeability, and cation exchange capacity tests. The maximum reading of the penetrometer is 9,000 pounds per square foot (PSF). The results of these tests are noted on the enclosed boring logs, soil profile, and Soil Test Data Summary sheets.

IX. Field Investigation

The five test borings were located in the field by means of tapemeasure based upon the diagram furnished by your representative at the locations shown on the enclosed location diagram. These locations were determined by your consultant to be representative of the subsoil conditions at the project site. Relative ground surface elevations were determined at the boring observation well locations by your consultant. The five test borings were taken to depths as determined by your consultant. The borings were started on August 30, 1976, and completed on September 2, 1976. A hollow stem auger (truck-mounted) type of drill rig was used to make the test borings. Soil samples were taken using a split barrel (ASTM D 1586) sampler in the borings at five foot maximum intervals. The soil types, nature, consistency, strata depths and thicknesses, the sampling data, and other conditions apt to affect design or construction were recorded on the field logs. In the split barrel sampling, the standard penetration "N" (the number of blows of a 140-pound hammer dropping 30 inches to drive the standard 2-inch O.D. split barrel) was recorded in 6-inch increments and entered on the field logs. Representative samples from the split tube were placed in jars, sealed, and delivered to the laboratory for further classification and testing. In the non-cohesive soils the hollow stem auger was used to prevent caving of the soils. During drilling, immediately after completion of drilling, and as long as 72 hours after completion of drilling, readings of the ground water were taken in the bore holes and the readings recorded on the boring logs.

General Conditions

A. Report Preparation and Review

This report has been prepared in accordance with Soil and Foundation Engineering practices generally accepted in this geographic area. No other warranty, expressed or implied, is intended. The report has been prepared for the client for his stated purposes only, and the report may not contain sufficient recommendations nor information for other parties or uses. In the event that any changes in the scope of the project, however slight, are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions and recommendations of this report modified or reaffirmed in writing. In the event that conclusions and recommendations based upon the data of this report are made by others, such conclusions and recommendations are not our responsibility unless a review is made and a concurring opinion is submitted in writing.

B. Test Boring Locations

The test borings have been located by the method stated in this report. The test borings were located to be within 10 feet from the location shown on the diagram enclosed with this report. Elevations of the ground surface at the boring locations are to an accuracy of plus or minus 0.5 feet.

C. Test Boring Logs

Field boring logs were prepared in the field by a qualified driller foreman. These field logs, on file in our office, give pertinent field data including boring number, date(s) of taking the boring, methods of drilling and sampling, depths of samples, descriptions of the various soils sampled, observed, and estimated between samples, ground water readings, and other observed conditions considered pertinent to the investigation. The soils between samples may have been determined by the drilling foreman based upon "feel" of the drill bit, or wash cuttings. The changes in soil strata may be transitional rather than abrupt, particularly with respect to coloring, weathering, and consistency changes. The amount of large sized gravel or boulders is generally estimated because sampling tubes seldom retain these larger sized soil particles. The field soils descriptions have been reviewed, and reaffirmed or modified by visual examination of soil samples by qualified soils person-

General Conditions (Continued)

C. Test Boring Logs (Continued)

nel in accordance with the enclosed boring log explanation sheet. Consistency classifications for the cohesive soils are based upon the laboratory tests, visual sample inspection, and/or field penetration tests. Denseness classifications for the granular soils are based upon the field penetration tests. The final test boring logs have been prepared from the field data, the sample review, and the laboratory data, and therefore are based upon both interpretive and factual data.

D. Ground Water

Our interpretations of the ground water levels on the site have been made based upon the water level readings stated on the soil boring logs. However, it must be noted that fluctuations in the level and quantity of the ground water may occur due to variations in rainfall, temperature, soil permeability, and other factors not evident at the time of the water level measurements. The probability of ground water level variation is anticipated, and the design drawings and specifications should accommodate such possibilities; construction planning should also be based upon such assumptions of ground water level variations.

E. Allowable Soil Bearing

The allowable soil bearing values recommended in this report include a minimum factor of safety as noted with respect to the minimum shear strength of soils encountered at the borings, with the estimated settlement noted. The allowable soil bearing is in excess of the existing overburden stress at the recommended depth.

F. Soil Variations and Construction Inspection

The analyses and recommendations made in this report are based upon the data obtained at the boring locations. The soil conditions in any local region are known to vary widely, and the borings performed for this investigation do not necessarily provide a complete picture of all soils that may exist at the site or that may be encountered during excavations for the project. This report does not reflect any soil variations which may exist away from the borings, and it may be necessary to re-evaluate the recommendations of this report after performing on-site inspections of all soils immediately after their exposure. It is recommended that we be retained to perform continuous subsoil inspection and construction review during the stripping, site grading, excavation, foundation, and backfilling phases of the project.

General Conditions (Continued)

F. Soil Variations and Construction Inspection (Continued)

Specifically, the construction inspection of subsoils should include the determination of "topsoil" stripping depth, verification of bearing soils, field tests of exposed cohesive soils to verify soil bearing capacities, approval of fills and backfills, and density tests to insure that fills and backfills are placed to specification requirements.

If the recommendations of this report include driven piling as a feasible foundation alternative, test piles should be driven at representative locations on the project site to determine possible pile length variations (especially if piles not easily spliced are selected). The minimum pile driving resistance, usually expressed in hammer blows per foot driven, should be calculated for the design pile capacity required utilizing an approved dynamic pile formula. All piles should be driven to the computed minimum driving resistance, but it should be emphasized that such pile driving control does not necessarily guarantee the computed capacities due to uncertainties in the dynamic equations. Full scale pile load tests remain the most reliable means of determining actual pile capacities and are ordinarily recommended.

If caisson foundations are included in the recommendations of this report, construction inspection and tests are recommended to verify design dimensions, plumbness, bottom cleanliness, and bearing capacities of the foundation soils.

G. Soil Volume Changes and Settlement

Initial foundation settlement is due to the inevitable immediate elastic deformation of the bearing soils as they are stressed. For the recommended bearing values at the stated depths, this initial settlement has been computed or estimated and the magnitude detailed in the Foundation Recommendation section of this report.

"Shrinkage" settlement is caused by the shrinkage of foundation bearing soils because of drying. Clay and silt soils characteristically shrink until their moisture content is reduced to a limiting value called the shrinkage limit. Although the drying of subsoils is not common in the area, the stated soils are susceptible to shrinkage. Prolonged droughts, withdrawal of soil moisture by trees and shrubs, and evaporation can cause "shrinkage" settlement of structures founded on or above these soils. The general practice in this geographical area is to assume this risk

General Conditions (Continued)

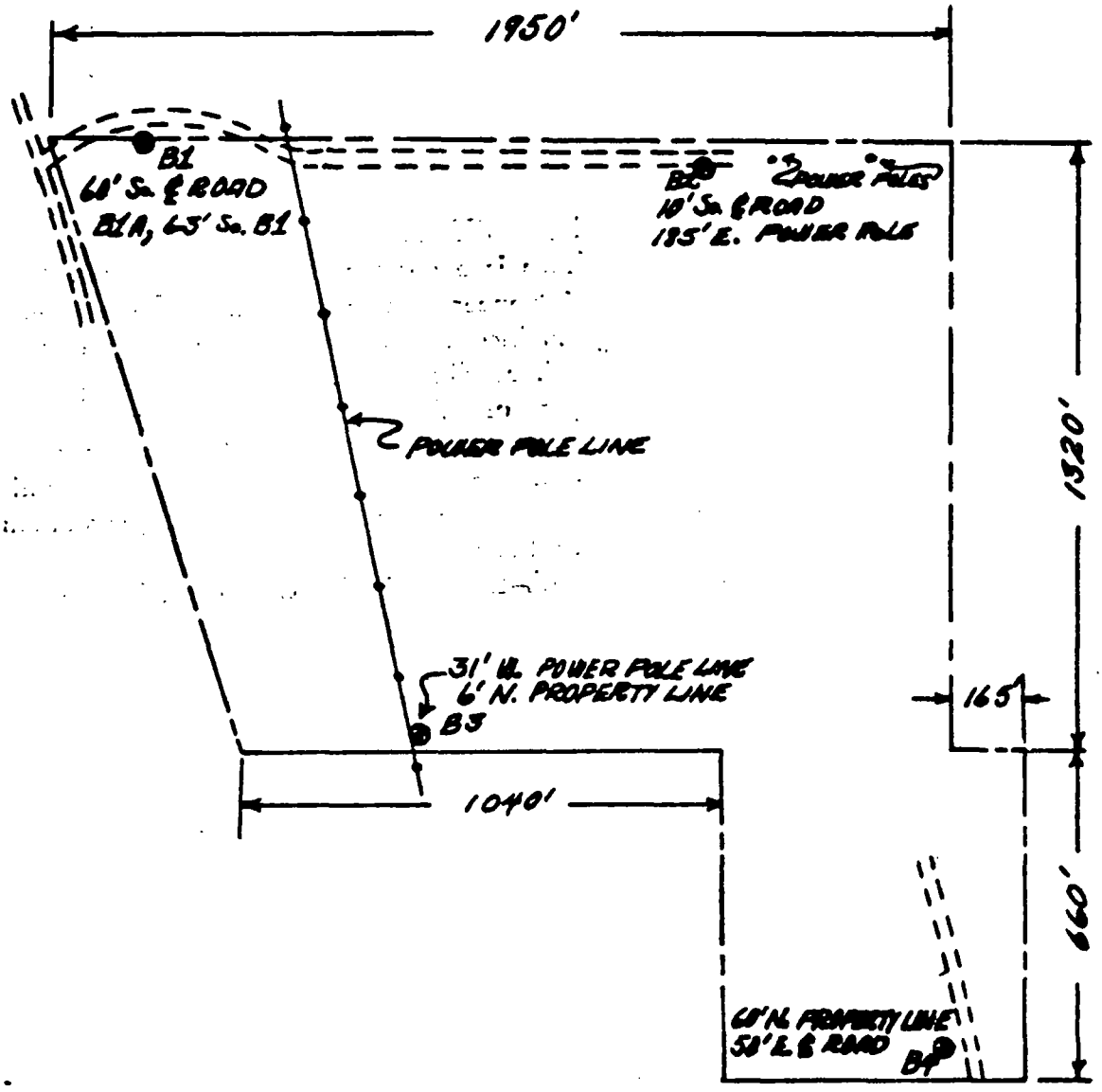
G. Soil Volume Changes and Settlement (Continued)

of possible "shrinkage" settlement of the shallower foundations rather than to utilize deeper and more costly foundations.

Heaving of foundations can occur if the bearing soils contain substantial quantities of certain clay minerals, principally montmorillonite, and if an increase in the moisture content of such soils occurs. Based on our experience, such soils with a high "swelling" potential are not known to occur naturally in this general area, and we have not performed index tests to determine the susceptibility of the soils at the project to such swelling.

Long-term foundation settlement may occur due to the "consolidation" of bearing soils which are very soft or soft in consistency. The magnitude of consolidation settlement experienced will depend on the thickness of the compressible soils, the degree of "softness" of the compressible soils, the magnitude of anticipated pressure increases, and the loading history of the soils. Laboratory consolidation tests provide the most reliable data on which to base estimates of magnitudes and time rates of consolidation of the soils in the field. Laboratory consolidation tests and geologic information (if available) can be of great assistance in estimating the degree to which the soils have been precompressed. Our consolidation analysis is based on the assumptions that the soft soils encountered at the borings are representative in type and thickness of the soft soils at the site and that structural loads furnished or assumed are close to actual loads to be applied. Total consolidation is usually divided into the "primary" and "secondary" phases. The primary phase is associated with a gradual expulsion of pore water, and the secondary phase is associated with a plastic reorientation of soil particles at equilibrium pore water pressure; both phases occur at an ever decreasing rate under constant applied loads.

The primary consolidation of inorganic compressible soils usually takes place over a several year period; and secondary consolidation settlement, though not as predictable, is generally negligible. For organic compressible soils, the secondary consolidation settlement could exceed the estimated primary settlement over the life of the proposed structure.



LEGEND:

● B1 SOIL TEST BORING

— - — - PROPERTY LINE

═══ ROAD

N

SOIL TEST BORING LOCATIONS
PAXTON LANDFILL
CHICAGO, ILLINOIS

WALTER H. FLOOD & CO. INC.

SCALE 1" = 400'	BY CSE
JOB FLAB NO 2L450039	DATE 10-19-76

FORM 1 SM 6-66 SSP

Walter H. Flood & Co., Inc.
ENGINEERS
4421 HARRISON STREET
HILLSIDE, ILLINOIS 60162
7508 S. WESTNEDGE AVENUE
PORTAGE, MICHIGAN 49081

SOIL BORING LOG NO. 1

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill

LOCATION: 12201 South Oglesby
Chicago, Illinois

METHOD OF BORING HS	WATER LEVEL READINGS	DRILLING DATA	BACKFILLING DATA
S.S. O.D. 2" 140# HAMMER 30" DROP	3.5';40.0';45.0' @	DATE 9/1/76	DATE
SHELBY TUBE SIZE	68.5' B.C.R.	FOREMAN DL ET	BY
CASING SIZE 68.5'-2½" IDHS	3.4' A.C.R.	CREW NO. 4	METHOD
CORE SIZE	26.3' @ 2 HRS. A.D.	JOB NO. 7605-0039	GROUT
	HRS. A.D.	VERT. SCALE 1" = 10'	QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
0.0						Ground Surface Elevation 5.1
1.0						see note 1
	1	SS	6			Sand and cinders, some brick, trace of roots, loose
	2	SS	5			
10.0						
	3	SS	12			Gray silty clay, trace of small gravel, tough to hard
	4	SS	14			
	5	SS	17			
	6	SS	24			
30.0						
	7	SS	37			Gray clayey silt, some sand seams, dense to very dense
	8	SS	36			
	9	SS	58			
	10	SS	63			
50.0						
51.0	11	SS	63			Gray silt, trace sand, very dense
						Gray silty clay, trace to little small to medium gravel, very tough to hard
	12	SS	55			
60.0						
						Continued on Page 2
						Note 1: Black sandy loam, some brick, glass, steel, fill

QU @ LABORATORY X 1000 PSF: 2 4 6 8 10
O PENETROMETER

WC Δ NATURAL %: 10 20 30 40 50

DEPTH	S	T	N	LR	DD	DESCRIPTION

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AD—AFTER DRILLING
BCR—BEFORE CASING REMOVAL
C—CORE
BCI—DRY CAVE IN
DD—DRY DENSITY, LB. PER CU. FT.
DEPTH—FEET BELOW GROUND SURFACE
FT—FISHTAIL
HA—HAND AUGER
HS—HOLLOW STEM AUGER
L—SAMPLE LENGTH
N—PENETRATION, BLOWS PER FT.
QU—UNCON. COMP. STRENGTH LBS. PER SQ. FT.
R—LENGTH OF SAMP. RECOVERED
S—SAMPLE NUMBER
SS—SPLIT SPOON
ST—SHELBY TUBE
T—TYPE OF SAMPLE
WC—WATER CONTENT %
WCI—WET CAVE IN
WD—WHILE DRILLING
WO—WASHOUT

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SOIL BORING LOG NO. 1

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill
12201 South Oglesby

LOCATION: Chicago, Illinois

METHOD OF BORING HS S.S. O.D. 2" 140# HAMMER 30" DROP SHELBY TUBE SIZE CASING SIZE 68.5'-2½" IDHS CORE SIZE	WATER LEVEL READINGS 3.5';40.0';45.0' W.D. 68.5' B.C.R. 3.4' A.C.R. 26.3' @ 2 HRS. A.D. HRS. A.D.	DRILLING DATA DATE 9/2/76 FOREMAN DL ET CREW NO. 4 JOB NO. 7605-0039 VERT. SCALE 1" = 10'	BACKFILLING DATA DATE BY METHOD GROUT QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
						Continued from Page 1
60.0	13	SS	48			Gray silty clay, trace to little small to medium gravel, very tough to hard
	14	SS	49			
70.0	15	SS	81			End of boring

QU ● LABORATORY X 1000 PSF 2 4 6 8 10
O PENETROMETER

DEPTH	S	T	N	LR	DD	DESCRIPTION

10 20 30 40 50
WC ▲ NATURAL %

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AB—AFTER DRILLING
BCR—BEFORE CASING REMOVAL
C—CORE
DCI—DRY CAVE IN
DD—DRY DENSITY, LB. PER CU. FT.
DEPTH—FEET BELOW GROUND SURFACE
FT—FISHTAIL
HA—HAND AUGER
HS—HOLLOW STEM AUGER
L—SAMPLE LENGTH
N—PENETRATION, BLOWS PER FT.
QU—UNCON. COMP. STRENGTH LBS. PER SQ. FT.
R—LENGTH OF SAMP. RECOVERED
S—SAMPLE NUMBER
SS—SPLIT SPOON
ST—SHELBY TUBE
T—TYPE OF SAMPLE
WC—WATER CONTENT %
WCI—WET CAVE IN
WD—WHILE DRILLING
WO—WASHOUT

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SOIL BORING LOG NO. 1A

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill

LOCATION: 12201 South Oglesby
Chicago, Illinois

METHOD OF BORING HS	WATER LEVEL READINGS	DRILLING DATA	BACKFILLING DATA
S.S. O.D. 2" 140# HAMMER 30" DROP	4.2' W.D.	DATE 9/2/76	DATE
SHELBY TUBE SIZE	B.C.R.	FOREMAN DL ET	BY
CASING SIZE 10.5'-2¼" IDHS	A.C.R.	CREW NO. 4	METHOD
CORE SIZE	10.3' @0.3 HRS. A.D.	JOB NO. 7605-0039	GROUT
	HRS. A.D.	VERT. SCALE 1" = 10'	QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
						Ground Surface Elevation 5.4
0.0						Black clay loam, brick, cinders, concrete, fill
6.0						Black sand
8.0						Gray sand
12.0						End of boring (gray silty clay)

QU ● LABORATORY X 1000 PSF — 2 — 4 — 6 — 8 — 10
○ PENETROMETER

DEPTH	S	T	N	LR	DD	DESCRIPTION

10 — 20 — 30 — 40 — 50
WC ▲ NATURAL %

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AD—AFTER DRILLING
BCR—BEFORE CASING REMOVAL
C—CORE
DCI—DRY CAVE IN
DD—DRY DENSITY, LB. PER CU. FT.
DEPTH—FEET BELOW GROUND SURFACE
FT—FISHTAIL
HA—HAND AUGER
HS—HOLLOW STEM AUGER
L—SAMPLE LENGTH
N—PENETRATION, BLOWS PER FT.
QU—UNCON. COMP. STRENGTH LBS. PER SQ. FT.
R—LENGTH OF SAMP. RECOVERED
S—SAMPLE NUMBER
SS—SPLIT SPOON
ST—SHELBY TUBE
T—TYPE OF SAMPLE
WC—WATER CONTENT %
WCI—WET CAVE IN
WD—WHILE DRILLING
WO—WASHOUT

Walter H. Flood & Co., Inc.
ENGINEERS
4421 HARRISON STREET
HILLSIDE, ILLINOIS 60162
7509 S. WESTNEDGE AVENUE
PORTAGE, MICHIGAN 49081

SOIL BORING LOG NO. 2

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill

LOCATION: 12201 South Oglesby
Chicago, Illinois

METHOD OF BORING: HS	WATER LEVEL READINGS	DRILLING DATA	BACKFILLING DATA
O.D. 2" 140# HAMMER 30" DROP	4.0' W.B.	DATE: 8/31/76	DATE
SHELBY TUBE SIZE	51.0' B.C.R.	FOREMAN: DL ET	BY
CASING SIZE: 68.5'-2½" IDHS	58.7' A.C.R.	CREW NO.: 4	METHOD
CORE SIZE	5.9' @ 48 HRS. A.D.	JOB NO.: 7605-0039	GROUT
	HRS. A.D.	VERT. SCALE: 1" = 10'	QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
						Ground Surface Elevation 5.6
0.0						Cinders, fill
1.0	1	SS	17			Brick and cinders, fill, medium dense
5.0	2	SS	10			Brown to dark gray fine sand, medium dense
10.0	3	SS	13			Gray silty clay, occasional sand seams, tough
15.0	4	SS	15			Gray fine sand, medium dense
20.0	5	SS	16			Gray silty clay, trace of small to medium gravel, occasional sand seams, very tough
	6	SS	28			
	7	SS	25			
35.0	8	SS	53			Gray clayey silt, trace of small to medium gravel, very dense
40.0	9	SS	26			Gray silty clay, trace to little small gravel, hard
	10	SS	54			
	11	SS	48			
	12	SS	56			
60.0						Continued on Page 2

QU ● LABORATORY X 1000 PSF — O PENETROMETER
2 4 6 8 10

10 20 30 40 50
WC Δ NATURAL %

DEPTH	S	T	N	LR	DD	DESCRIPTION

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AD—AFTER DRILLING
BCR—BEFORE CASING REMOVAL
C—CORE
DCI—DRY CAVE IN
DD—DRY DENSITY, LB. PER CU. FT.
DEPTH—FEET BELOW GROUND SURFACE
FT—FISHTAIL
HA—HAND AUGER
HS—HOLLOW STEM AUGER
L—SAMPLE LENGTH
N—PENETRATION, BLOWS PER FT.
QU—UNCON. COMP. STRENGTH LBS. PER SQ. FT.
R—LENGTH OF SAMP. RECOVERED
S—SAMPLE NUMBER
SS—SPLIT SPOON
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T—TYPE OF SAMPLE
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SOIL BORING LOG NO. 2

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill

LOCATION: 12201 South Oglesby
Chicago, Illinois

METHOD OF BORING: HS S.S. O.D. 2" 140# HAMMER 30" DROP SHELBY TUBE SIZE CASING SIZE: 68.5'-2½" IDHS CORE SIZE	WATER LEVEL READINGS 4.0' W.D. 51.0' B.C.R. 58.7' A.C.R. 5.9' @ 48 HRS. A.D. HRS. A.D.	DRILLING DATA DATE: 9/1/76 FOREMAN: DL ET CREW NO.: 4 JOB NO.: 7605-0039 VERT. SCALE: 1" = 10'	BACKFILLING DATA DATE BY METHOD GROUT QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
						Continued from Page 1
60.0	13	SS	39			Gray silty clay, trace to little small gravel, hard
	14	SS	70			
70.0	15	SS	59			End of boring

QU ● LABORATORY X 1000 PSF
O PENETROMETER
2 4 6 8 10

DEPTH	S	T	N	LR	DD	DESCRIPTION

10 20 30 40 50
WC ▲ NATURAL %

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AD—AFTER DRILLING
BCR—BEFORE CASING REMOVAL
C—CORE
DCI—DRY CAVE IN
DD—DRY DENSITY, LB. PER CU. FT
DEPTH—FEET BELOW GROUND SURFACE
FT—FISHTAIL
HA—HAND AUGER
HS—HOLLOW STEM AUGER
L—SAMPLE LENGTH
N—PENETRATION, BLOWS PER FT.
QU—UNCON. COMP. STRENGTH LBS. PER SQ. FT.
R—LENGTH OF SAMP. RECOVERED
S—SAMPLE NUMBER
SS—SPLIT SPOON
ST—SHELBY TUBE
T—TYPE OF SAMPLE
WC—WATER CONTENT %
WCI—WET CAVE IN
WD—WHILE DRILLING

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PORTAGE, MICHIGAN 49081

SOIL BORING LOG NO. 3

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill

LOCATION: 12201 South Oglesby
Chicago, Illinois

METHOD OF BORING	HS
S.S. O.D. 2" 140# HAMMER 30" DROP	
SHELBY TUBE SIZE	
CASING SIZE	68.5'-2½" IDHS
CORE SIZE	

WATER LEVEL READINGS	
3.0'	W.D.
Dry	B.C.R.
68.5'	A.C.R.
7.6' @ 72	HRS. A.D.
	HRS. A.D.

DRILLING DATA	
DATE	8/30/76
FOREMAN	DL ET
CREW NO.	4
JOB NO.	7605-0039
VERT. SCALE	1" = 10'

BACKFILLING DATA
DATE
BY
METHOD
GROUT
QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
						Ground Surface Elevation 6.2
0.0						See note 1
1.0	1	SS	6			Black loam, glass, wood, fill, loose
5.0	2	SS	2			Black clay, trace of roots and cinders, soft
10.0						Brown fine sand, loose
11.0	3	SS	6			Brown and gray to gray clay, soft to tough
	4	SS	5			
	5	SS	9			
20.0	6	SS	12			Gray silty clay, trace of small gravel, very tough
	7	SS	18			
	8	SS	18			
35.0	9	SS	30			Gray silt, dense
40.0	10	SS	65			Gray silty clay, trace to some small to medium gravel, hard
	11	SS	42			
	12	SS	49			
	13	SS	48			
60.0						Continued on Page 2

Note 1: Brown to black clay, glass, wood, plastic, steel, fill

QU @ LABORATORY X 1000 PSF — O PENETROMETER

2 4 6 8 10

10 20 30 40 50

WC ▲ NATURAL %

DEPTH	S	T	N	LR	DD	DESCRIPTION

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AD—AFTER DRILLING
BCR—BEFORE CASING REMOVAL
C—CORE
DCI—DRY CAVE IN
DD—DRY DENSITY, LB. PER CU. FT.
DEPTH—FEET BELOW GROUND SURFACE
FT—FISHTAIL
HA—HAND AUGER
HS—HOLLOW STEM AUGER
L—SAMPLE LENGTH
N—PENETRATION, BLOWS PER FT.
QU—UNCON. COMP. STRENGTH LBS. PER SQ. FT.
R—LENGTH OF SAMP. RECOVERED
S—SAMPLE NUMBER
SS—SPLIT SPOON
ST—SHELBY TUBE
T—TYPE OF SAMPLE
WC—WATER CONTENT %
WCI—WET CAVE IN
WD—WHILE DRILLING
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PORTAGE, MICHIGAN 49081

SOIL BORING LOG NO. 3

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill

LOCATION: 12201 South Oglesby Chicago, Illinois

METHOD OF BORING	HS
S.S. O.D. 2" 140# HAMMER 30" DROP	
SHELBY TUBE SIZE	
CASING SIZE	68.5'-2¼" IDHS
CORE SIZE	

WATER LEVEL READINGS	
3.0'	W.D.
Dry	B.C.R.
68.5'	A.C.R.
7.6' @ 72	HRS. A.D.
	HRS. A.D.

DRILLING DATA	
DATE	8/31/76
FOREMAN	DL ET
CREW NO.	4
JOB NO.	7605-0039
VERT. SCALE	1" = 10'

BACKFILLING DATA
DATE
BY
METHOD
GROUT
QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
						Continued from Page 1
60.0	14	SS	40			Gray silty clay, trace to some small to medium gravel, hard
65.0	15	SS	61			Gray silty clay, trace of shale, hard
70.0	16	SS	66			End of boring

QU ● LABORATORY X 1000 PSF — O PENETROMETER

2 4 6 8 10

10 20 30 40 50

WC ▲ NATURAL %

DEPTH	S	T	N	LR	DD	DESCRIPTION

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AB—AFTER DRILLING
BCR—BEFORE CASING REMOVAL
C—CORE
DCI—DRY CAVE IN
DD—DRY DENSITY, LB. PER CU. FT.
DEPTH—FEET BELOW GROUND SURFACE
FT—FISHTAIL
HA—HAND AUGER
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L—SAMPLE LENGTH
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QU—UNCON. COMP. STRENGTH LBS. PER SQ. FT.
R—LENGTH OF SAMP. RECOVERED
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T—TYPE OF SAMPLE
WC—WATER CONTENT %
WCI—WET CAVE IN
WD—WHILE DRILLING
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PORTAGE, MICHIGAN 49081

SOIL BORING LOG NO. 4

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill
12201 South Oglesby

LOCATION: Chicago, Illinois

METHOD OF BORING	HS
(I.S. O.D. 2" 140# HAMMER 30" DROP	
SHELBY TUBE SIZE	
CASING SIZE	68.5'-2¼" IDHS
CORE SIZE	

WATER LEVEL READINGS	
8.0'	W.D.
70.0'	B.C.R.
68.5'	A.C.R.
11.5' @ 72	HRS. A.D.
	HRS. A.D.

DRILLING DATA	
DATE	8/30/76
FOREMAN	DL ET
CREW NO.	4
JOB NO.	7605-0039
VERT. SCALE	1" = 10'

BACKFILLING DATA
DATE
BY
METHOD
GROUT
QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
						Ground Surface Elevation 13.5
0.0						See note 1
1.0	1	SS	13			Black clay loam, fill
5.0	2	SS	3			Black clay loam with cinders and wood, some plastic, rubber, fill, soft
10.0	3	SS	4			Black sand with medium gravel, very loose
15.0	4	SS	10			Brown to gray fine sand, medium dense
21.0	5	SS	11			Gray silty clay, trace of small to large gravel, stiff to tough
	6	SS	11			
	7	SS	15			— $P_{vm} = 2.25 \times 10^{-8}$
	8	SS	18			
40.0	9	SS	45			Gray clayey silt, dense
45.0	10	SS	38			Gray silty clay, trace of small gravel, very tough to hard
	11	SS	37			
	12	SS	24			
60.0						Continued on Page 2
						Note 1: crushed stone with cinders, brick, slag, fill

QU @ LABORATORY X 1000 PSF — O PENETROMETER

2 4 6 8 10

10 20 30 40 50

WC ▲ NATURAL %

DEPTH	S	T	N	LR	DD	DESCRIPTION

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AB—AFTER BRILLING
BCR—BEFORE CASING REMOVAL
C—CORE
DCI—DRY CAVE IN
DD—DRY DENSITY, LB. PER CU. FT.
DEPTH—FEET BELOW GROUND SURFACE
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7509 S. WESTNEDGE AVENUE
PORTAGE, MICHIGAN 49081

SOIL BORING LOG NO. 4

FOR: Paxton Landfill Corporation

PROJECT: Paxton Landfill

LOCATION: 12201 South Oglesby
Chicago, Illinois

METHOD OF BORING	HS
S.S. O.D. 2" 140# HAMMER 30" DROP	
SHELBY TUBE SIZE	
CASING SIZE	68.5'-2½" IDHS
CORE SIZE	

WATER LEVEL READINGS	
8.0'	W.D.
70.0'	B.C.R.
68.5'	A.C.R.
11.5' @ 72 HRS.	A.D.
HRS.	A.D.

DRILLING DATA	
DATE	8/30/76
FOREMAN	DL ET
CREW NO.	4
JOB NO.	7605-0039
VERT. SCALE	1" = 10'

BACKFILLING DATA
DATE
BY
METHOD
GROUT
QUANTITY

DEPTH	S	T	N	LR	DD	DESCRIPTION
						Continued from Page 1
60.0						
60.2	13	SS	31			2" seam gray fine sand
						Gray silty clay, trace of small gravel, hard
	14	SS	73			
70.0	15	SS	54			
						End of boring

QU ● LABORATORY X 1000 PSF
O PENETROMETER
2 4 6 8 10

WC ▲ NATURAL %
10 20 30 40 50

DEPTH	S	T	N	LR	DD	DESCRIPTION

LEGEND:
A—AUGER
ACR—AFTER CASING REMOVAL
AD—AFTER DRILLING
BCR—BEFORE CASING REMOVAL
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T—TYPE OF SAMPLE
WC—WATER CONTENT %
WCI—WET CAVE IN
WD—WHILE DRILLING
WO—WASHOUT

WALTER H. FLOOD & CO., INC.

SOIL BORING LOG EXPLANATION

TEXTURAL CLASSIFICATION

Texture	Symbol	Abbreviation	Size	Abbreviation	Soil Particle Size
Boulder		Bo			over 3.0"
Gravel		GR	Large	L	1.0" to 3.0"
			Medium	M	.38" to .99"
			Small	Sm	2.0mm to .38"
Sand		S	Coarse	Co	.75mm to 1.99mm
			Medium	M	.25mm to .74mm
			Fine	F	.074mm to .24mm
Silt		Si			.005mm to .073mm
Clay		C			Smaller than .005mm

COHESIVE SOIL CLASSIFICATION

Class	Symbol	Abbreviation	Major Soil Constituent, % of Dry Weight Sand	Silt	Clay
Clay		C	less than 50	less than 50	20–100
Silty Clay		SiC	less than 20	50–80	20–50
Sandy Clay		SC	50–80	less than 20	20–50

Consistency	Abbreviation	N	Qu	
very soft	VS	0–2	less than 700	If the clay content of a soil is great enough the clay characteristics dominate the soil mass. CLAY becomes the soil classification with the other constituents being modifying.
soft	S	3–4	700–1200	
stiff	ST	5–8	1201–2000	
tough	T	9–16	2001–4000	
very tough	VT	17–30	4001–8000	
hard	H	over 30	over 8000	

NON-COHESIVE SOIL CLASSIFICATION

Class	Symbol	Abbreviation	Major Soil Constituent, % of Dry Weight Sand	Silt	Clay
Silt		Si	less than 20	80–100	less than 20
Sand		S	80–100	less than 20	less than 20

Density	Abbreviation	N	
very loose	VL	0–4	If the sand or silt content of a soil is great enough the soil becomes non-cohesive or semi-cohesive. The soil classification becomes SAND or SILT with the other soil constituents being modifying.
loose	L	5–9	
medium dense	MD	10–29	
dense	D	30–49	
very dense	VD	50 and over	

QUANTITY MODIFIERS

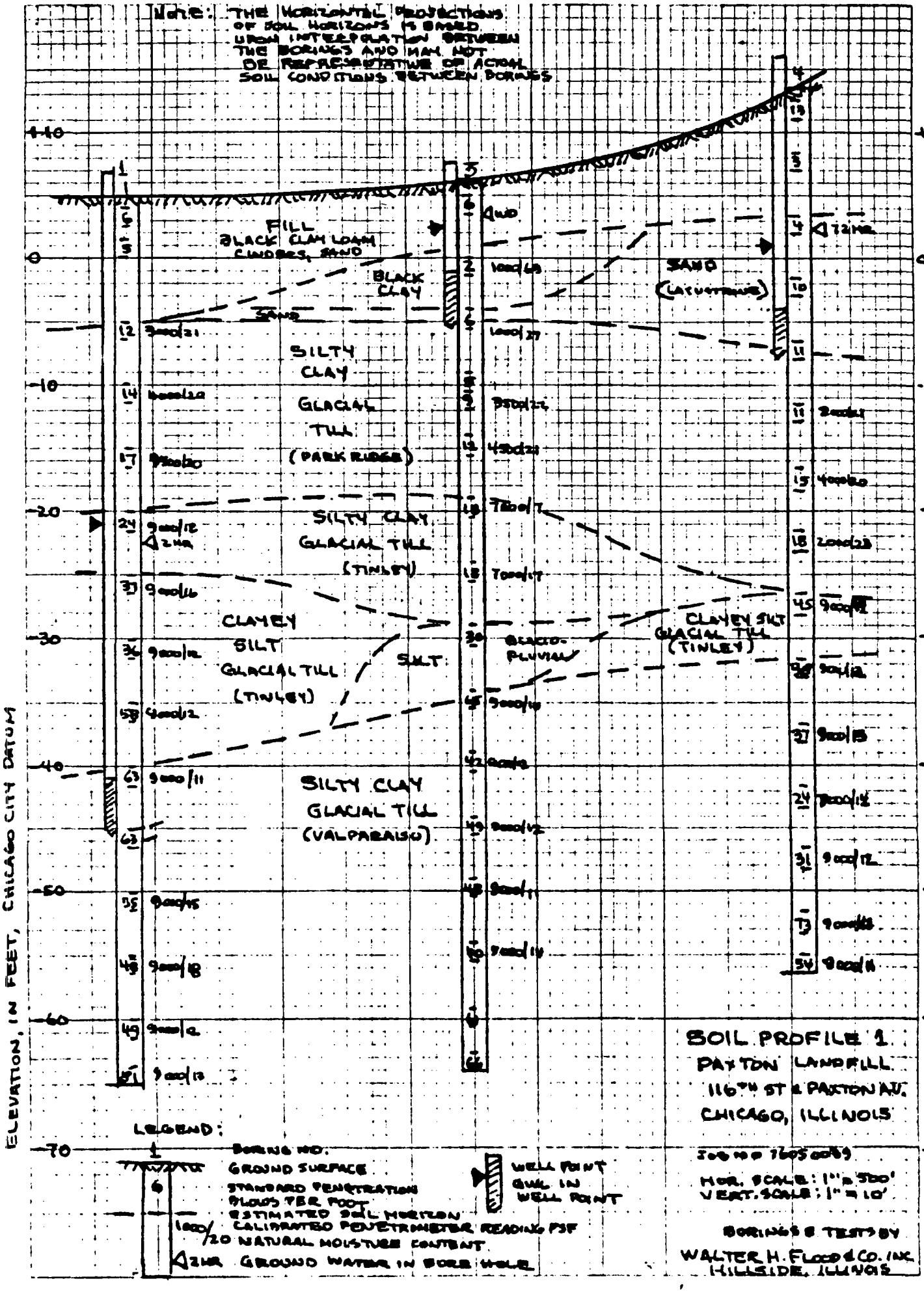
Term	Abbreviation	% of Dry Weight
trace or occasional	TR or OC	0–10
little	LI	11–20
some	SO	21–35
and or with	& or w/	36–50

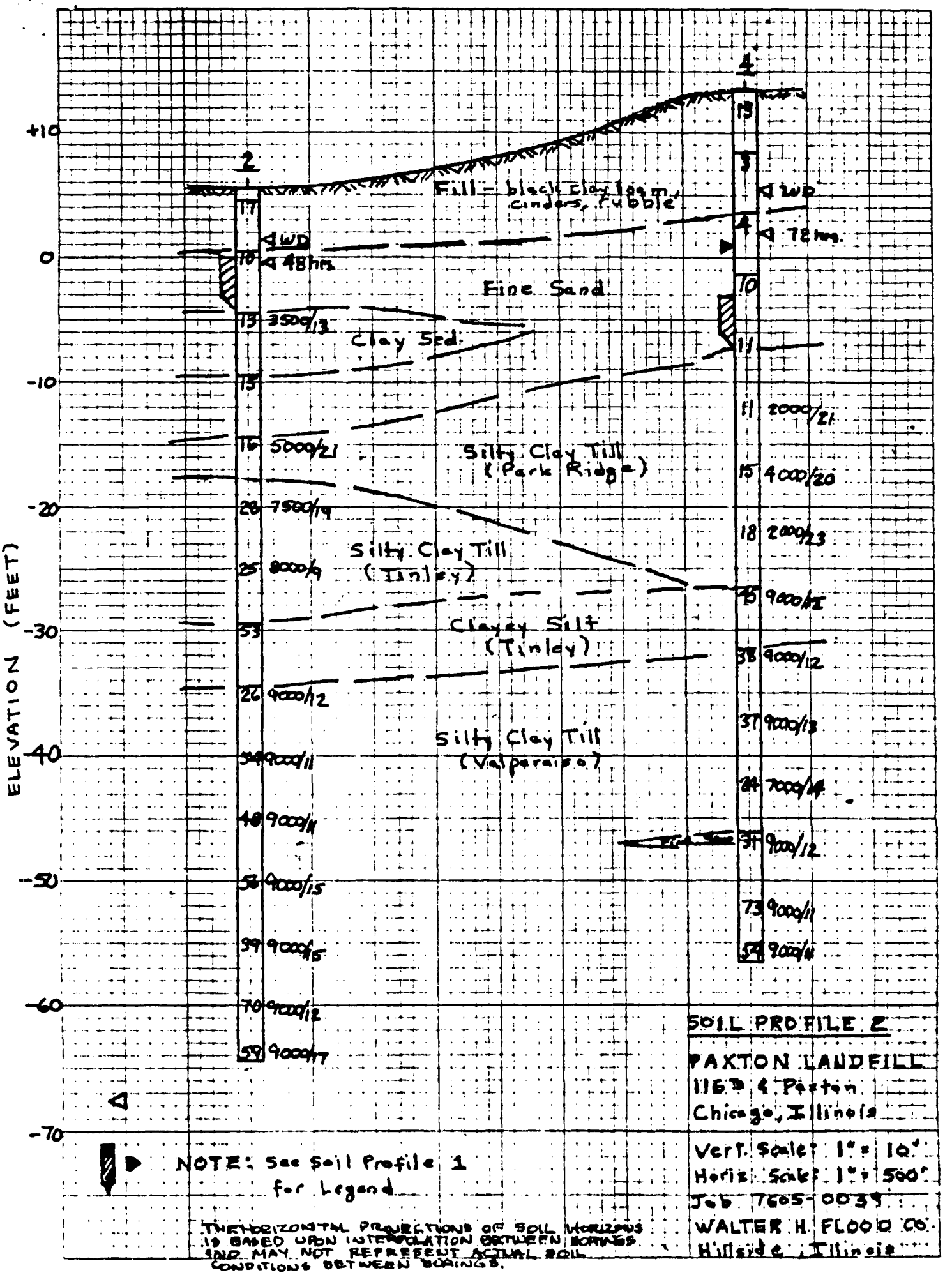
WATER LEVELS

Symbol	Explanation
—▽—	final water level
WCI	wet cave in
DCI	dry cave in
WD	while drilling

DRILLING AND SAMPLING SYMBOLS AND ABBREVIATIONS

ST	Shelby tube or thin wall tube (ASTM D-1587)	WO	Washout
SS	Split spoon or split tube (ASTM D-1586)	C	Core
A	Auger boring or auger sample	HA	Hand auger
HS	Hollow stem auger		
Qu	Unconfined compressive strength, pounds per square foot		
N	Standard penetration, blows per foot of 140# hammer, 30" drop, 2" O.D. SS		


Note: THE HORIZONTAL PROJECTIONS OF SOIL HORIZONS IS BASED UPON INTERPOLATION BETWEEN THE BORINGS AND MAY NOT BE REPRESENTATIVE OF ACTUAL SOIL CONDITIONS BETWEEN BORINGS
FILL
BLACK CLAY LOAM CINDERS, SAND
BLACK CLAY
SILTY CLAY GLACIAL TILL (PARK RIDGE)
SILTY CLAY GLACIAL TILL (TINLEY)
CLAYEY SILT GLACIAL TILL (TINLEY)
SAND (LACUSTRINE)
CLAYEY SILT GLACIAL TILL (TINLEY)
SILTY CLAY GLACIAL TILL (VALPARAISO)
ELEVATION, IN FEET, CHICAGO CITY DATUM
LEGEND:
BORING NO.
GROUND SURFACE
STANDARD PENETRATION BLOWS PER FOOT
ESTIMATED SOIL HORIZON
CALIBRATED PENETROMETER READING PSF
NATURAL MOISTURE CONTENT
GROUND WATER IN BORE HOLE
WELL POINT
CASING IN WELL POINT
SOIL PROFILE 1
PAXTON LANDFILL
116TH ST & PAXTON AV.
CHICAGO, ILLINOIS
HOR. SCALE: 1" = 100'
VERT. SCALE: 1" = 10'
BORINGS & TESTS BY
WALTER H. FLOOD & CO. INC.
HILLSIDE, ILLINOIS



NOTE: See Soil Profile 1 for Legend

THE HORIZONTAL PROJECTIONS OF SOIL HORIZONS IS BASED UPON INTERPOLATION BETWEEN BORINGS AND MAY NOT REPRESENT ACTUAL SOIL CONDITIONS BETWEEN BORINGS.

SOIL PROFILE E

PAXTON LANDFILL
115th & Paxton
Chicago, Illinois

Vert. Scale: 1" = 10'
Horiz. Scale: 1" = 500'
Job 7605-0039
WALTER H. FLOOD CO.
Hillside, Illinois

Walter H. Flood & Co., Inc.
ENGINEERS

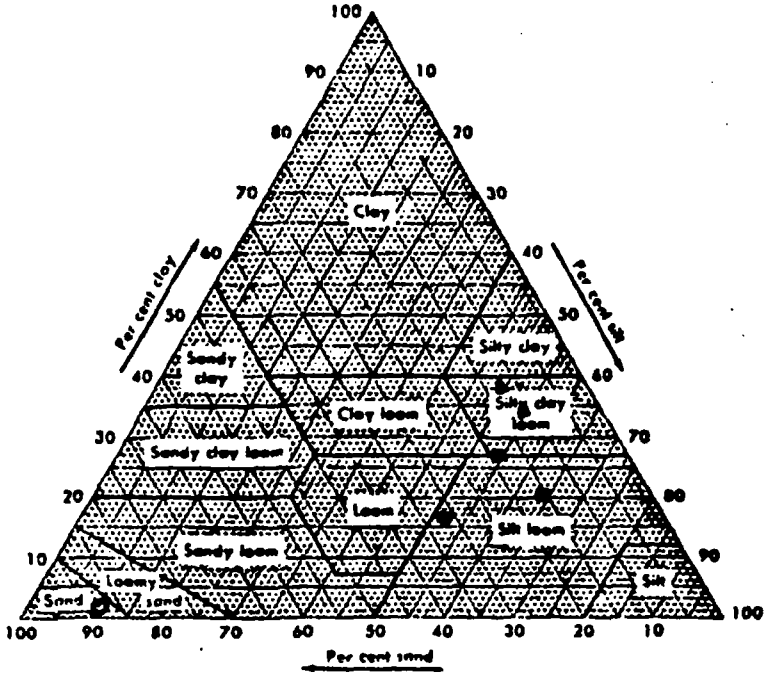
SOIL TEST DATA SUMMARY

CLIENT Paxton Landfill Corporation JOB NO. 7605-0039

PROJECT Paxton Landfill DATE October 19, 1976

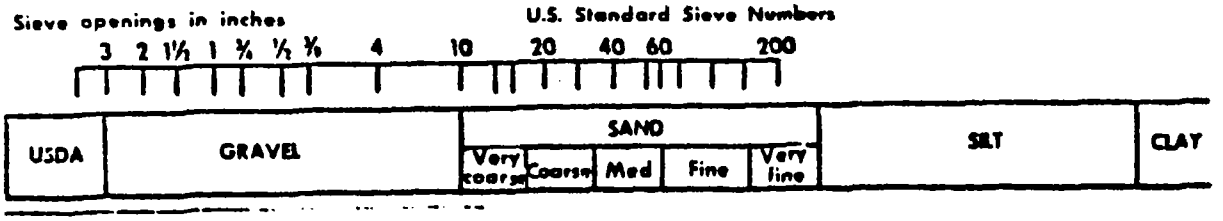
LOCATION 116th & Paxton, Chicago, Illinois

Laboratory Test No.							
Bore No. - Sample No.	1-4	4-7	2-10	3-14	2-8	4-4	
Depth							
USDA Grain Size Classification	silty clay loam	silty clay loam	silty loam	silty loam	silty loam	sand	
Unified Soil Classification							
AHRB Classification & Group Index							
Graduation - Passing 1" Sieve %							
" 3/4" " %							
" 1/2" " %							
" No. 4 " %	100.0	100.0	100.0	100.0	100.0	100.0	
" No. 10 " %	97.0	95.9	96.0	96.8	94.4	99.9	
" No. 40 " %	93.1	92.5	91.0	89.6	81.8	99.4	
" No. 100 " %	89.5	89.6	86.5	84.3	73.3	50.3	
" No. 200 " %	86.7	88.9	84.3	80.7	68.1	9.9	
Sand %	13.3	11.1	15.7	19.3	31.9	90.1	
Silt %	47.9	55.0	64.1	53.1	51.1	7.8	
Clay %	38.8	33.9	20.2	27.6	17.0	2.1	
Liquid Limit %	35.7	36.5	24.2	26.9	22.0		
Plastic Limit %	18.2	19.8	13.8	14.3	15.8		
Plasticity Index %	17.5	16.7	10.4	12.6	6.2		
Shrinkage Limit %							
Bearing Ratio %							
Standard Dry Density AASHO T99 PCF							
Optimum Moisture %							
Unconfined compressive strength PSF	4000	4000	9000	9000			
Failure Strain %							
Failure Type							
Natural Moisture Content %	20.4	20.3	11.0	14.0	11.5		
Natural Dry Density PCF							
Cation Exchange Capacity Me/100 gr.	1.4	35.86	16.54	5.59	3.75		
Compression Index							
Permeability, remolded cm/sec		2.25×10^{-8}			2.11×10^{-7}		
Permeability, remolded dry density PCF		103.5			92.9		
Permeability, remolded moisture %		19.7			13.7		



Sand—2.0 to 0.05 mm. diameter
Silt—0.05 to 0.002 mm. diameter
Clay—smaller than 0.002 mm. diameter

PARTICLE SIZE SCALE



- ○ POST GLACIAL
- ▲ PARK RIDGE TILL
- ● TINLEY TILL
- ■ VALPARAISO TILL

U.S. DEPARTMENT OF AGRICULTURE

TEXTURAL CLASSIFICATION CHART

WALTER H. FLOOD & CO. INC.

SCALE	BY WM
JOB/LAB NO. 780503	DATE 10/15/76

STAGES OF LAKE MICHIGAN